

#### NASA AOC Research Areas



#### AOC automation

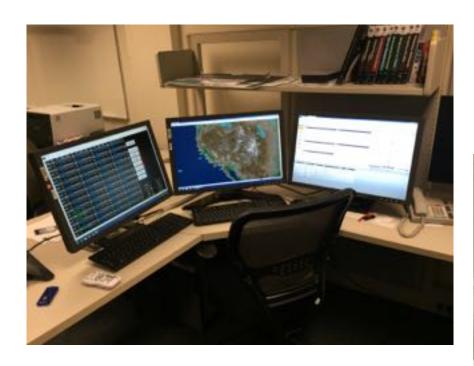
- Applied advanced "cognitive computing" systems to airline operations
- Objective was to improve access to documents (e.g., FAA Regulations, airline procedures, etc.) and Internet resources

#### Winter weather operations

- Developing automation tool to improve airport operations during winter storms
- Objective is to reduce cancelations and delays due to winter weather
- Creating AOC laboratory to support research
  - At NASA Ames in the Human Systems Integration
     Division

# Airline Operations Research Group (AORG)







#### Winter Weather



- Developing the "Flight Awareness Collaboration Tool" (FACT)
- Concentrates information about winter weather events on one display
- Includes predictive tools
- Supports collaboration between AOC, air traffic control, airport authority, and de-icing operators
- User interface designed completed and web-based prototype under development
- User group at Detroit airport
- Space Act Agreement with Virgin America to support FACT evaluation
  - Virgin America backup AOC located at NASA Ames

#### **FACT Information**



- Weather status and forecasts
- Reporting of runway closures for snow/ice treatment
- Runway braking action
- Visual display of surface traffic movement at airport
- Hourly arrival and departure rates
- Airport runway configuration
- De-icing areas
- Notices to Airmen
- Field conditions
- FAA Operational Information System
- Aviation Digital Data Service icing information
- Runway visual range
- Tracking of arrival flights in en route airspace

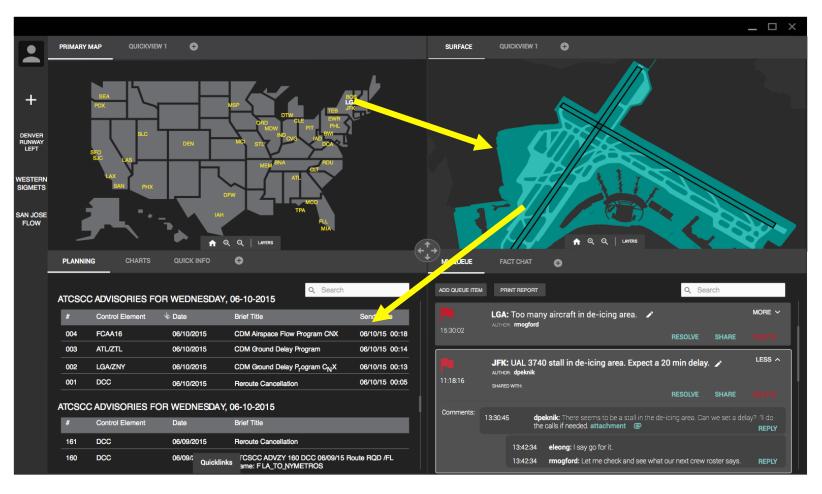
# FACT User Interface Design



	Quick View Tabs	Quick View Tabs
	<b>Primary Map View</b> displays current US map	Surface Map View displays current airport surface map
Profiles Bar	ZOOM/PAN CONTROLS/COLLAPSIBLE MENU	ZOOM/PAN CONTROLS/COLLAPSIBLE MENU
	Quick View Tabs	Quick View Tabs
	Information View formatted data for current airport	Communication View communication with other groups and issue tracking

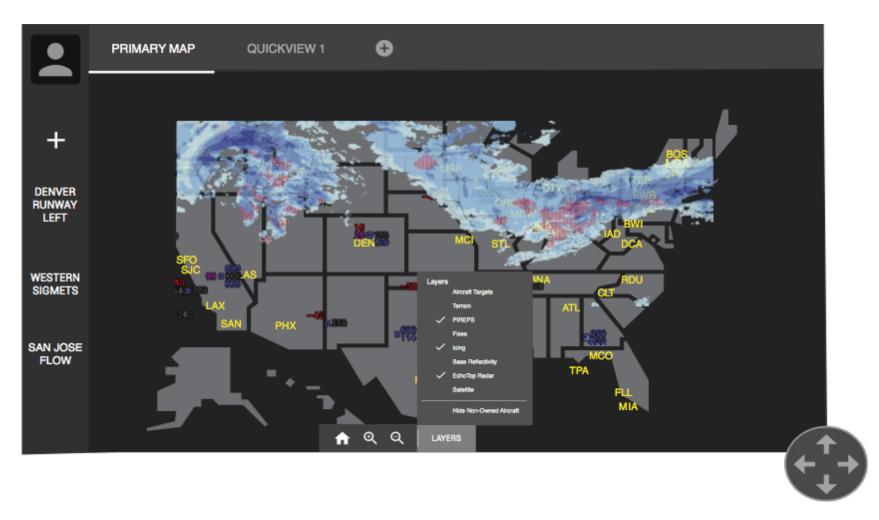
# **FACT User Interface Design**





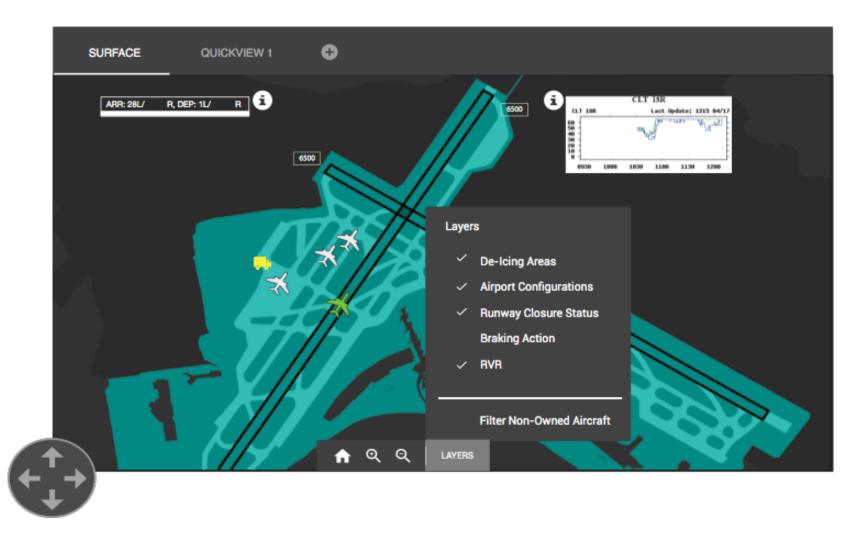
# **Primary Map View**





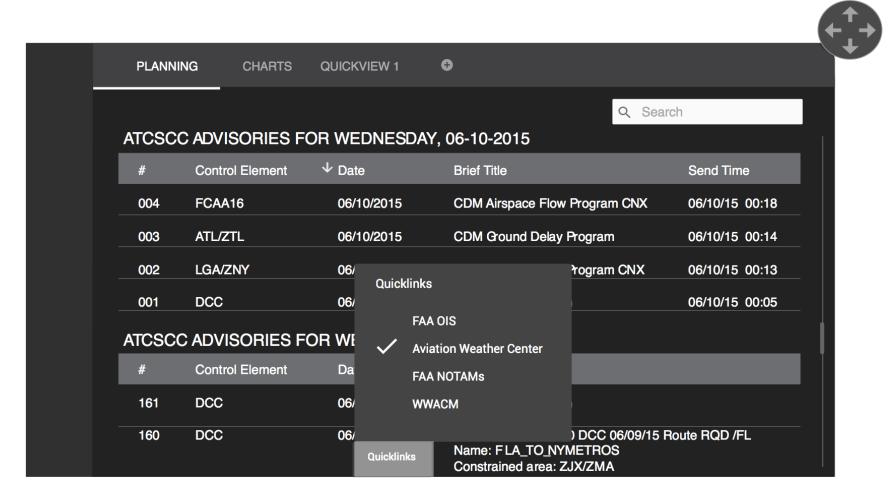
# Surface Map View





## Information View

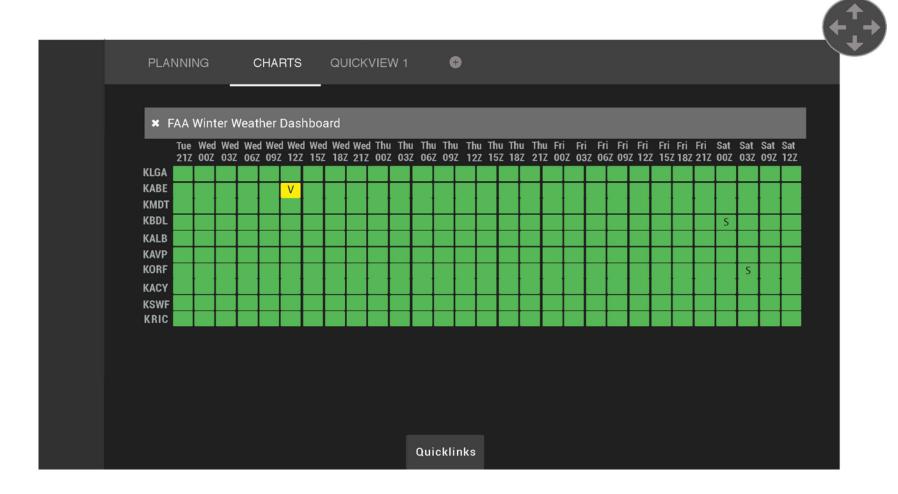




Gathers and "tailors" data from external web sites

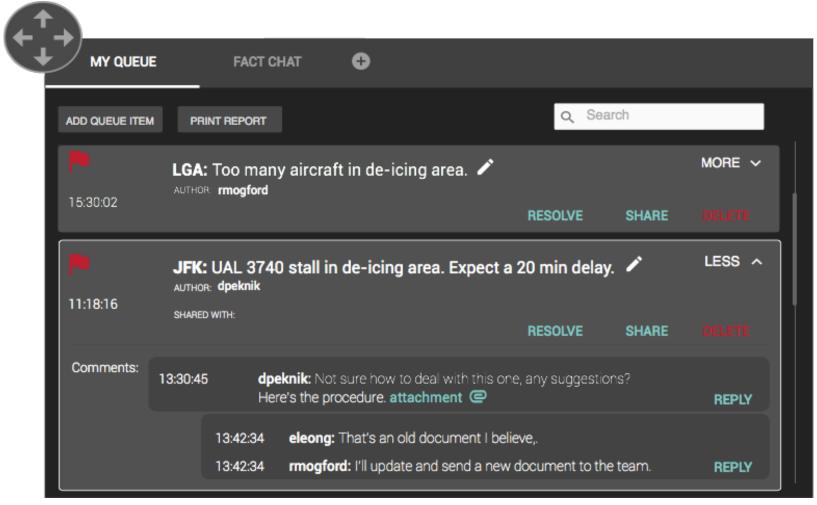
## Information View





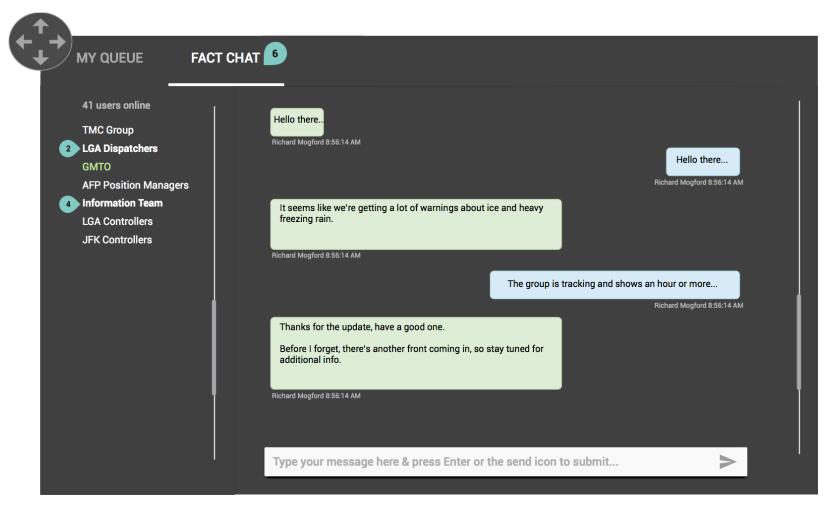
## **Communication View**





## **Communication View**





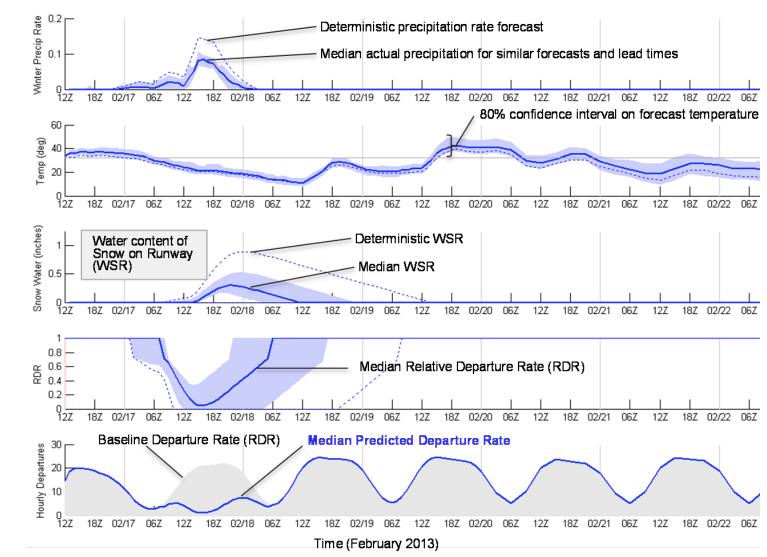
# **FACT Implementation**



- FACT is a web-based application
- Receives JAVA messages from the FAA System Wide Information Management (SWIM) data repository
- Surface movement data are from ASDE-X
- Data are acquired from web pages and tailored for the Information View
- Predictive tools will be built into FACT
- First one competed is Metron's Winter Weather Airport Capacity Model (WWACM)
  - Predicts changes in airport departure rates from weather reports

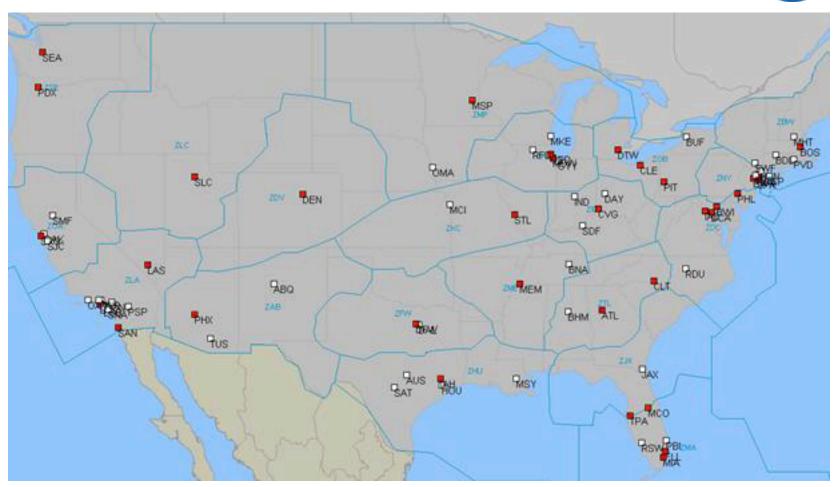
#### **WWACM**





# **WWACM**

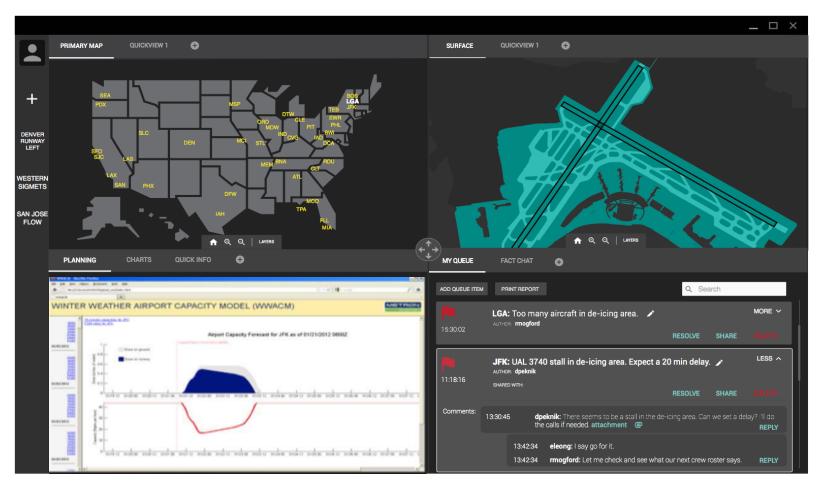




The 77 airports included in WWACM

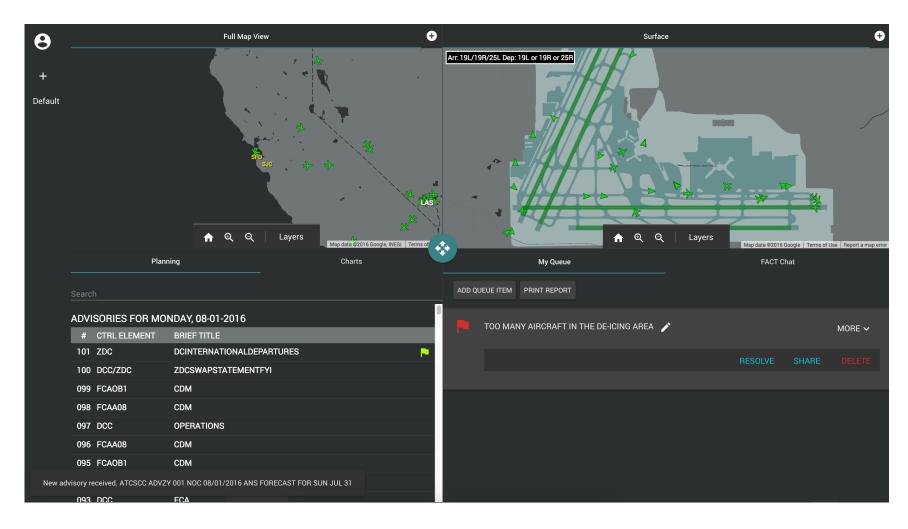
## **WWACM** in FACT





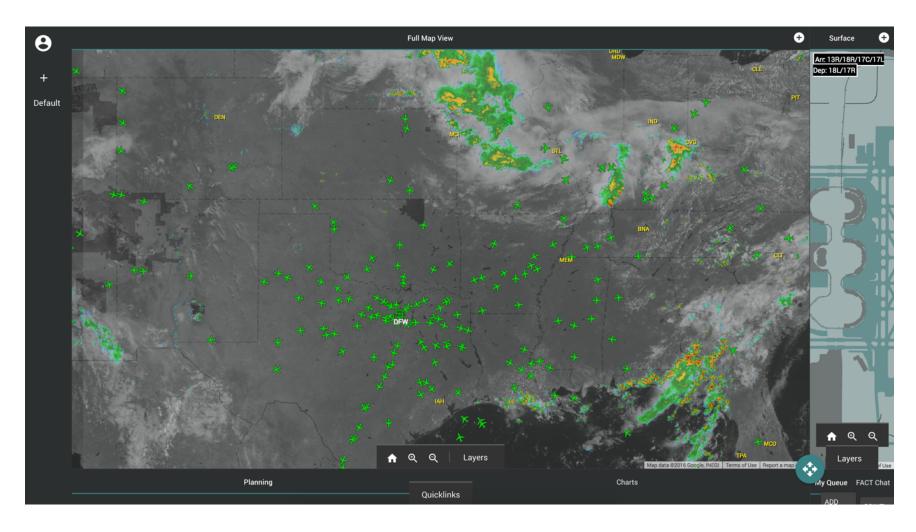
# **FACT Prototype**





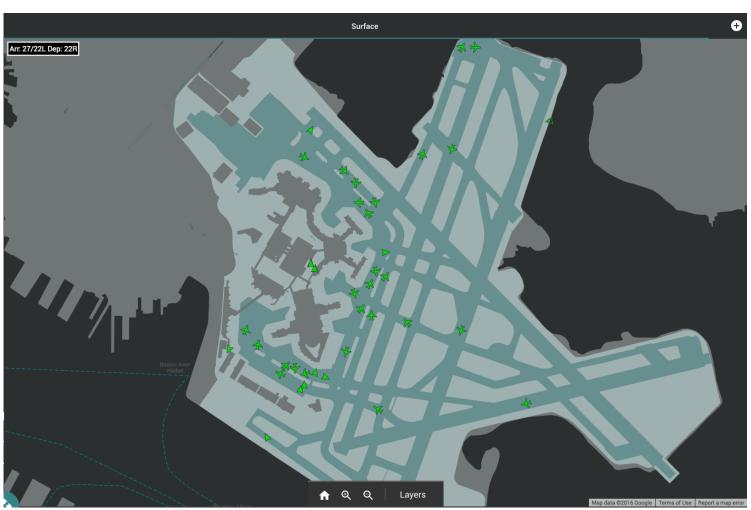
# **Primary Map**





# Surface Map





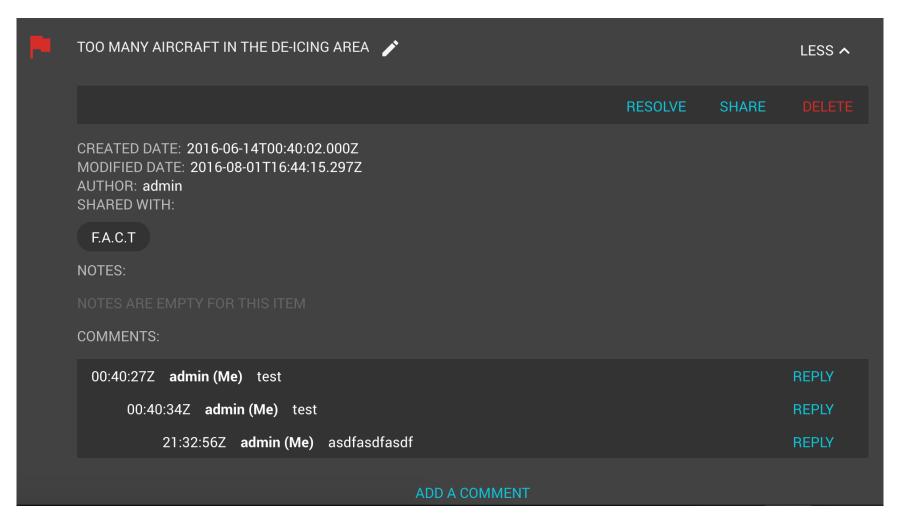
# Information



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ADVISORIES FOR MONDAY, 08-01-2016					
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100	DCC/ZDC	ZDCSWAPSTATEMENTFYI			
099	FCAOB1	CDM			
098	FCAA08	СDМ			
097	DCC	OPERATIONS			
096	FCAA08	CDM			
095	FCAOB1	CDM			
094	DCC	FCA			
093	DCC	FCA			
092	BWI/ZDC	CDM	Quicklinks		

#### Communication





## **FACT Progress**



- Web-based prototype will be completed by the end of 2016
- Example of an approach for display integration
- Plan to demonstrate to airlines and airports to seek feedback
- FACT platform will be used to host additional automation tools (e.g., diversion management, planning snow removal)
- Creating AOC simulator at NASA Ames to evaluate FACT
- Will evaluate FACT in operational settings

# NASA/Industry Collaboration



- Airline Operations Workshop in August 2016
  - Around 200 attendees
  - Focused on NASA, FAA, and private sector innovations to support the airlines (AOC and flight deck)
  - Identified gaps where research is needed

#### Research themes

- AOC simulation
- Study dispatcher workload, situation awareness, errors
- Display/system integration
- Managing/accessing large information databases from multiple sources
- Display/system integration
- Preferred routes

